Texas Commission on Environmental Quality

A Possible Method to Develop Nutrient Criteria

The criteria are derived by utilizing the pooled two-sample *t* procedure formula (shown below) which utilizes the arithmetic mean, standard deviation and Student's *t* value for the number of data values used for each calculation. Water quality standards attainment is evaluated as an assessment period mean of at least ten samples taken on different dates not to exceed the derived criterion. The assessment period should be the same as used in the 305(b) assessment.

The calculation is based on the minimum value for the assessment period mean nutrient parameter would have to attain such that a Student's *t* test would reject the null hypothesis that the assessment period mean and the mean of the baseline data were drawn from the same population with a probability of 0.05 (one-tailed). Assumes assessment period mean is based on at least ten samples and the variances of the baseline data set and data used for calculating the assessment period mean are the same.

Calculated as follows:

$$\text{Criterion} = \bar{x}_1 + t_{(1)(0.05)}(s_{\bar{x}1 \,-\, \bar{x}2})$$

Where: criterion = the value the assessment period mean should not exceed

$\bar{x}_1$ = mean of the baseline data set

$t_{(1)(0.05)}$ = critical value of the *t* distribution where $\propto = 0.05$ one tailed at $n + 10$ degrees of freedom

$s_{\bar{x}1 - \bar{x}2}$ = standard error for the difference of two means

$$= \sqrt{(s_p^2/n_1 + s_p^2/n_2)}$$

Where: n_1 = number of samples in baseline data set

$n_2 = 10$ = number of samples used to calculate assessment period mean

$s_p^2 = 2(s^2(n_1 - 1))/(n_1 + 2)$

s = standard deviation of the baseline data

Reference: Moore, D. S. and G. P. McCabe. 1993. The pooled two-sample *t* procedures. pp 542-549. *In Introduction to the practice of statistics*. W. H. Freeman and Company, New York.

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Reference Reservoirs	Non Reference Reservoirs	
Canyon Lake	Aquilla Reservoir	Lake Waxahachie
Falcon Lake	Bardwell Reservoir	Lake Weatherford
Greenbelt Reservoir	Belton Reservoir	Lake Worth
Houston County Lake	Benbrook Lake	Leon Reservoir
Hubbard Creek Reservoir	Cedar Creek Reservoir	Lewisville Lake
Inks Lake	Choke Canyon	Millers Creek Reservoir
Lake Amon G. Carter	E.V. Spence Reservoir	Navarro Mills Reservoir
Lake Bridgeport	Eagle Mountain Reservoir	O.H. Ivie Reservoir
Lake Buchanan	Granger Lake	Oak Creek Reservoir
Lake Cisco	Grapevine Reservoir	Pat Cleburne Reservoir
Lake Corpus Christi	Greenbelt Reservoir	Pat Mayse Reservoir
Lake Cypress Springs	Joe Pool Lake	Possum Kingdom Reservoir
Lake Fork Reservoir	Lake Anahuac	Proctor Lake
Lake Georgetown	Lake Arlington	Richland-Chambers Reservoir
Lake Jacksonville	Lake Arrowhead	Toledo Bend Reservoir
Lake Marble Falls	Lake Austin	Town Lake
Lake Murvaul	Lake Brownwood	White River Lake
Lake Palo Pinto	Lake Colorado City	
Lake Travis	Lake Crook	
Lake Tyler	Lake Fort Phantom Hill	
Medina Lake	Lake Granbury	
O.C. Fisher Reservoir	Lake Houston	
Somerville Lake	Lake J.B. Thomas	
Stillhouse Hollow Lake	Lake Kickapoo	
Wright Patman Lake	Lake Lavon	
	Lake Livingston	
	Lake Lyndon B. Johnson	
	Lake Mackenzie	
	Lake Meredith	
	Lake Nasworthy	
	Lake O' The Pines	
	Lake Palestine	
	Lake Ray Hubbard	
	Lake Stamford	
	Lake Sweetwater	
	Lake Tawakoni	
	Lake Texoma	
	Lake Theo	
	Lake Tyler east	
	Lake Waco	